

Claims

- [c1] 1. An electroless brass-plating method for providing a brass layer to a metallic piece comprising the steps of:
submitting the piece to an alkaline degrease;
performing a first rinsing to the piece;
submitting the piece to a cathodic degrease;
performing a second rinsing to the piece;
submitting the piece to an electroless brass-plating for providing a brass layer on the piece's surface, by submerging the piece in a solution containing: oxide zinc, as source of zinc atoms, copper cyanide as source of copper atoms, a complexing agent, a buffer type substance and a pH controller;
performing a third rinsing;
submitting the piece to a fixing treatment for fixing the brass layer to the piece's surface and
drying the piece.
- [c2] 2. The method as claimed in claim 1, wherein the alkaline degrease is carried out by submerging the piece in a solution having 23g/lit of sodium carbonate and 23 g/lit of trisodic phosphate at a temperature of between 75 ° C and 90 ° C for at least 2 minutes under constant stirring.
- [c3] 3. The method as claimed in claim 1, wherein the alkaline degrease is carried out by submerging the piece in a solution having between 18 and 28 g/lit of sodium carbonate and between 18 and 28 g/lit of trisodic phosphate at a temperature of between 70 ° C and 85 ° C for 3 minutes under constant stirring.
- [c4] 4. The method as claimed in claim 1, wherein the first rinsing is carried out by submerging the piece in a countercurrent water stream at ambient temperature during at least 1 minute.
- [c5] 5. The method as claimed in claim 1, wherein the cathodic degrease is carried out by submerging the piece for a time no longer than 60 seconds in a sodium hydroxide solution at 2% at ambient temperature and applying a current of 3 to 5 Amp/dm² under constant stirring, and wherein the piece performs the function of an anode and a stainless steel metal rod performs the function of a

cathode.

- [c6] 6. The method as claimed in claim 1, wherein the cathodic degrease is carried out by submerging the piece for a time no longer than 60 seconds in a sodium hydroxide solution at 2% at ambient temperature and applying a current of 3 to 5 Amp/dm² under constant stirring, and wherein the piece performs the function of an anode and a graphite rod performs the function of a cathode.
- [c7] 7. The method of the claim 1, wherein the cathodic degrease is carried out by submerging the piece for a time of between 40 and 60 seconds in a solution containing 15 to 25 g/lit of sodium hydroxide at ambient temperature and applying a current of 3–5 Amp/dm² under constant stirring, and wherein the piece performs the function of an anode and a stainless steel rod performs the function of a cathode.
- [c8] 8. The method of the claim 1, wherein the cathodic degrease is carried out by submerging the piece for a time of between 40 and 60 seconds in a solution containing 15 to 25 g/lit of sodium hydroxide and applying a current of 3 to 5 Amp//dm² under constant stirring, and wherein the piece performs the function of an anode and a graphite rod performs the function of a cathode.
- [c9] 9. The method as claimed in claim 1, wherein the first rinsing is carried out by submerging the piece in a countercurrent water stream at ambient temperature during at least 1 minute.
- [c10] 10. The method as claimed in claim 1, wherein in the electroless brass–plating step, the complexing agent comprises a Rochelle's salt.
- [c11] 11. The method as claimed in claim 1, wherein in the electroless brass–plating step the bath contains from 27 to 30 g/lit of sodium hydroxide, from 47 to 58 g/lit of sodium cyanide, from 18 to 22 g/lit of zinc oxide, from 32 to 37 g/lit of copper cyanide, from 13 to 17 g/lit of sodium carbonate, from 18 to 22 g/lit of Rochelle's salt and from 10 ml/lit of ammonia.
- [c12] 12. The method as claimed in claim 1, wherein in the electroless brass–plating the solution must be at a temperature of between 40 ° C and 80 ° C.

- [c13] 13. The method as claimed in claim 1, wherein in the electroless brass-plating step, the solution must be at a temperature of between 55 ° C and 65 ° C.
- [c14] 14. The method as claimed in claim 1, wherein in the electroless brass-plating step, the pieces must be submerged in the solution for a time of 5 to 25 minutes.
- [c15] 15. The method as claimed in claim 1, wherein in the electroless brass-plating step, the pieces must be submerged in the solution for a time of 10 to 15 minutes.
- [c16] 16. The method as claimed in claim 1, wherein in the electroless brass-plating step, the solution is constantly stirred.
- [c17] 17. The method as claimed in claim 1, wherein in the electroless brass-plating step, the solution has a pH higher than 11.
- [c18] 18. The method as claimed in claim 1, wherein the third rinsing is carried out by submerging the piece in a countercurrent water stream at ambient temperature during at least 1 minute.
- [c19] 19. The method as claimed in claim 1, wherein the fixing treatment comprises submerging the piece in an acid solution containing boric acid at a concentration of between 7 to 27 g/lit having a pH lower than 5, and at a temperature of between 35 ° C and 75 °, for a time of 10 to 45 minutes under constant stirring.
- [c20] 20. The method as claimed in claim 1, wherein the fixing treatment comprises submerging the piece in an acid solution containing boric acid at a concentration of between 15 to 19 g/lit, having a pH lower than 4, and at a temperature of between 45 to 60 ° C, for a time of 20 to 30 minutes under constant stirring.
- [c21] 21. The method as claimed in claim 1, wherein the drying is carried out by exposing the piece to an air current at ambient temperature for at least 1 minute.

- [c22] 22. The method as claimed in claim 1, wherein the brass layer has a thickness of from 5 to 7 μ m.
- [c23] 23. An electroless brass-plating method for providing a brass layer to a ceramic or plastic piece comprising the steps of:
 submitting the piece to an alkaline degrease;
 performing a first rinsing to the piece;
 submitting the piece to an electroless brass-plating for providing a brass layer on the piece's surface, by submerging the piece in a solution containing: oxide zinc, as source of zinc atoms, copper cyanide as source of copper atoms, a complexing agent, a buffer type substance and a pH controller;
 performing a second rinsing;
 submitting the piece to a fixing treatment for fixing the brass layer to the piece's surface and
 drying the piece.
- [c24] 24. The method as claimed in claim 23, wherein the alkaline degrease is carried out by submerging the piece in a solution having 23g/lit of sodium carbonate and 23 g/lit of trisodic phosphate at a temperature of between 75 ° C and 90 ° C for at least 2 minutes under constant stirring.
- [c25] 25. The method as claimed in claim 23, wherein the alkaline degrease is carried out by submerging the piece in a solution having between 18 and 28 g/lit of sodium carbonate and between 18 and 28 g/lit of trisodic phosphate at a temperature of between 70 ° C and 85 ° C for 3 minutes under constant stirring.
- [c26] 26. The method of the claim 23, wherein the first rinsing is carried out by submerging the piece in a countercurrent water stream at ambient temperature during at least 1 minute.
- [c27] 27. The method as claimed in claim 23, wherein in the electroless brass-plating step, the complexing agent comprises a Rochelle's salt.
- [c28] 28. The method as claimed in claim 23, wherein in the electroless brass-plating step the bath contains from 27 to 30 g/lit of sodium hydroxide, from 47 to 58 g/lit of sodium cyanide, from 18 to 22 g/lit of zinc oxide, from 32 to 37 g/lit of

copper cyanide, from 13 to 17 g/lit of sodium carbonate, from 18 to 22 g/lit of Rochelle's salt and from 10 ml/lit of ammonia.

- [c29] 29. The method as claimed in claim 23, wherein in the electroless brass-plating the solution must be at a temperature of between 40 ° C and 80 ° C.
- [c30] 30. The method as claimed in claim 23, wherein in the electroless brass-plating step, the solution must be at a temperature of between 55 ° C and 65 ° C.
- [c31] 31. The method as claimed in claim 23, wherein in the electroless brass-plating step, the pieces must be submerged in the solution for a time of 5 to 25 minutes.
- [c32] 32. The method as claimed in claim 23, wherein in the electroless brass-plating step, the pieces must be submerged in the solution for a time of 10 to 15 minutes.
- [c33] 33. The method as claimed in claim 23, wherein in the electroless brass-plating step , the solution is constantly stirred.
- [c34] 34. The method as claimed in claim 23, wherein in the electroless brass-plating step, the solution has a pH higher than 11.
- [c35] 35. The method as claimed in claim 23, wherein the second rinsing is carried out by submerging the piece in a countercurrent water stream at ambient temperature during at least 1 minute.
- [c36] 36. The method as claimed in claim 23, wherein the fixing treatment comprises submerging the piece in an acid solution containing boric acid at a concentration of between 7 to 27 g/lit having a pH lower than 5, and at a temperature of between 35 ° C and 75 ° , for a time of 10 to 45 minutes under constant stirring.
- [c37] 37. The method as claimed in claim 23, wherein the fixing treatment comprises submerging the piece in an acid solution containing boric acid at a concentration of between 15 to 19 g/lit, having a pH lower than 4, and at a temperature of between 45 to 60 ° C, for a time of 20 to 30 minutes under

constant stirring.

- [c38] 38. The method as claimed in claim 23, wherein the drying is carried out by exposing the piece to an air current at ambient temperature for at least 1 minute.
- [c39] 39. The method as claimed in claim 23, wherein the brass layer has a thickness of from 5 to 7 μ m.
- [c40] 40. A brass-plated metallic piece product, produced using an electroless brass-plating process for providing a brass layer to said metallic piece, said process comprising the steps of:
submitting the piece to an alkaline degrease;
performing a first rinsing to the piece;
submitting the piece to a cathodic degrease;
performing a second rinsing to the piece;
submitting the piece to an electroless brass-plating for providing a brass layer on the piece's surface, by submerging the piece in a solution containing: oxide zinc, as source of zinc atoms, copper cyanide as source of copper atoms, a complexing agent, a buffer type substance and a pH controller;
performing a third rinsing;
submitting the piece to a fixing treatment for fixing the brass layer to the piece's surface and
drying the piece.
- [c41] 41. The product-by-process as claimed in claim 40, wherein the alkaline degrease is carried out by submerging the piece in a solution having 23g/lit of sodium carbonate and 23 g/lit of trisodic phosphate at a temperature of between 75 ° C and 90 ° C for at least 2 minutes under constant stirring.
- [c42] 42. The product-by-process as claimed in claim 40, wherein the alkaline degrease is carried out by submerging the piece in a solution having between 18 and 28 g/lit of sodium carbonate and between 18 and 28 g/lit of trisodic phosphate at a temperature of between 70 ° C and 85 ° C for 3 minutes under constant stirring.

- [c43] 43. The product-by-process as claimed in claim 40, wherein the first rinsing is carried out by submerging the piece in a countercurrent water stream at ambient temperature during at least 1 minute.
- [c44] 44. The product-by-process as claimed in claim 40, wherein the cathodic degrease is carried out by submerging the piece for a time no longer than 60 seconds in a sodium hydroxide solution at 2% at ambient temperature and applying a current of 3 to 5 Amp/dm² under constant stirring, and wherein the piece performs the function of an anode and a stainless steel metal rod performs the function of a cathode.
- [c45] 45. The product-by-process as claimed in claim 40, wherein the cathodic degrease is carried out by submerging the piece for a time no longer than 60 seconds in a sodium hydroxide solution at 2% at ambient temperature and applying a current of 3 to 5 Amp/dm² under constant stirring, and wherein the piece performs the function of an anode and a graphite rod performs the function of a cathode.
- [c46] 46. The product-by-process of the claim 40, wherein the cathodic degrease is carried out by submerging the piece for a time of between 40 and 60 seconds in a solution containing 15 to 25 g/lit of sodium hydroxide at ambient temperature and applying a current of 3-5 Amp/dm² under constant stirring, and wherein the piece performs the function of an anode and a stainless steel rod performs the function of a cathode.
- [c47] 47. The product-by-process of the claim 40, wherein the cathodic degrease is carried out by submerging the piece for a time of between 40 and 60 seconds in a solution containing 15 to 25 g/lit of sodium hydroxide and applying a current of 3 to 5 Amp//dm² under constant stirring, and wherein the piece performs the function of an anode and a graphite rod performs the function of a cathode.
- [c48] 48. The product-by-process as claimed in claim 40, wherein the first rinsing is carried out by submerging the piece in a countercurrent water stream at ambient temperature during at least 1 minute.
- [c49] 49. The product-by-process as claimed in claim 40, wherein in the electroless

brass-plating step, the complexing agent comprises a Rochelle's salt.

- [c50] 50. The product-by-process as claimed in claim 40, wherein in the electroless brass-plating step the bath contains from 27 to 30 g/lit of sodium hydroxide, from 47 to 58 g/lit of sodium cyanide, from 18 to 22 g/lit of zinc oxide, from 32 to 37 g/lit of copper cyanide, from 13 to 17 g/lit of sodium carbonate, from 18 to 22 g/lit of Rochelle's salt and from 10 ml/lit of ammonia.
- [c51] 51. The product-by-process as claimed in claim 40, wherein in the electroless brass-plating the solution must be at a temperature of between 40 ° C and 80 ° C.
- [c52] 52. The product-by-process as claimed in claim 40, wherein in the electroless brass-plating step, the solution must be at a temperature of between 55 ° C and 65 ° C.
- [c53] 53. The product-by-process as claimed in claim 40, wherein in the electroless brass-plating step, the pieces must be submerged in the solution for a time of 5 to 25 minutes.
- [c54] 54. The product-by-process as claimed in claim 40, wherein in the electroless brass-plating step, the pieces must be submerged in the solution for a time of 10 to 15 minutes.
- [c55] 55. The product-by-process as claimed in claim 40, wherein in the electroless brass-plating step , the solution is constantly stirred.
- [c56] 56. The product-by-process as claimed in claim 40, wherein in the electroless brass-plating step, the solution has a pH higher than 11.
- [c57] 57. The product-by-process as claimed in claim 40, wherein the third rinsing is carried out by submerging the piece in a countercurrent water stream at ambient temperature during at least 1 minute.
- [c58] 58. The product-by-process as claimed in claim 40, wherein the fixing treatment comprises submerging the piece in an acid solution containing boric acid at a concentration of between 7 to 27 g/lit having a pH lower than 5, and at

a temperature of between 35 ° C and 75 ° , for a time of 10 to 45 minutes under constant stirring.

[c59] 59. The product-by-process as claimed in claim 40, wherein the fixing treatment comprises submerging the piece in an acid solution containing boric acid at a concentration of between 15 to 19 g/l, having a pH lower than 4, and at a temperature of between 45 to 60 ° C, for a time of 20 to 30 minutes under constant stirring.

[c60] 60. The product-by-process as claimed in claim 40, wherein the drying is carried out by exposing the piece to an air current at ambient temperature for at least 1 minute.

[c61] 61. The product-by-process as claimed in claim 40, wherein the brass layer has a thickness of from 5 to 7 µ m.

[c62] 62. A brass-plated ceramic or plastic piece product, produced using an electroless brass-plating method for providing a brass layer to said ceramic or plastic piece, said process comprising the steps of:
submitting the piece to an alkaline degrease;
performing a first rinsing to the piece;
submitting the piece to an electroless brass-plating for providing a brass layer on the piece's surface, by submerging the piece in a solution containing: oxide zinc, as source of zinc atoms, copper cyanide as source of copper atoms, a complexing agent, a buffer type substance and a pH controller;
performing a second rinsing;
submitting the piece to a fixing treatment for fixing the brass layer to the piece's surface and
drying the piece.

[c63] 63. The product-by-process as claimed in claim 62, wherein the alkaline degrease is carried out by submerging the piece in a solution having 23g/l of sodium carbonate and 23 g/l of trisodic phosphate at a temperature of between 75 ° C and 90 ° C for at least 2 minutes under constant stirring.

[c64] 64. The product-by-process as claimed in claim 62, wherein the alkaline

degrease is carried out by submerging the piece in a solution having between 18 and 28 g/lit of sodium carbonate and between 18 and 28 g/lit of trisodic phosphate at a temperature of between 70 ° C and 85 ° C for 3 minutes under constant stirring.

[c65] 65. The product-by-process of the claim 62, wherein the first rinsing is carried out by submerging the piece in a countercurrent water stream at ambient temperature during at least 1 minute.

[c66] 66. The product-by-process as claimed in claim 62, wherein in the electroless brass-plating step, the complexing agent comprises a Rochelle's salt.

[c67] 67. The product-by-process as claimed in claim 62, wherein in the electroless brass-plating step the bath contains from 27 to 30 g/lit of sodium hydroxide, from 47 to 58 g/lit of sodium cyanide, from 18 to 22 g/lit of zinc oxide, from 32 to 37 g/lit of copper cyanide, from 13 to 17 g/lit of sodium carbonate, from 18 to 22 g/lit of Rochelle's salt and from 10 ml/lit of ammonia.

[c68] 68. The product-by-process as claimed in claim 62, wherein in the electroless brass-plating the solution must be at a temperature of between 40 ° C and 80 ° C.

[c69] 69. The product-by-process as claimed in claim 62, wherein in the electroless brass-plating step, the solution must be at a temperature of between 55 ° C and 65 ° C.

[c70] 70. The product-by-process as claimed in claim 62, wherein in the electroless brass-plating step, the pieces must be submerged in the solution for a time of 5 to 25 minutes.

[c71] 71. The product-by-process as claimed in claim 62, wherein in the electroless brass-plating step, the pieces must be submerged in the solution for a time of 10 to 15 minutes.

[c72] 72. The product-by-process as claimed in claim 62, wherein in the electroless brass-plating step , the solution is constantly stirred.

- [c73] 73. The product-by-process as claimed in claim 62, wherein in the electroless brass-plating step, the solution has a pH higher than 11.
- [c74] 74. The product-by-process as claimed in claim 62, wherein the second rinsing is carried out by submerging the piece in a countercurrent water stream at ambient temperature during at least 1 minute.
- [c75] 75. The product-by-process as claimed in claim 62, wherein the fixing treatment comprises submerging the piece in an acid solution containing boric acid at a concentration of between 7 to 27 g/lit having a pH lower than 5, and at a temperature of between 35 ° C and 75 ° , for a time of 10 to 45 minutes under constant stirring.
- [c76] 76. The product-by-process as claimed in claim 62, wherein the fixing treatment comprises submerging the piece in an acid solution containing boric acid at a concentration of between 15 to 19 g/lit, having a pH lower than 4, and at a temperature of between 45 to 60 ° C, for a time of 20 to 30 minutes under constant stirring.
- [c77] 77. The product-by-process as claimed in claim 62, wherein the drying is carried out by exposing the piece to an air current at ambient temperature for at least 1 minute.
- [c78] 78. The product-by-process as claimed in claim 62, wherein the brass layer has a thickness of from 5 to 7 μ m.